ferroamp

Product Catalogue 2021

EnergyHub
The system that changes everything

More than the new normal

Ferroamp is a rapidly expanding cleantech company offering solutions for power optimisation, measurement, control and phase balancing for houses, apartment buildings and commercial and industrial premises. We offer patented solutions for installing DC nano-grids in buildings, greatly reducing power losses for property owners who have installed photovoltaics, who wish to offer electric vehicle charging and who need to store energy.

We are the sole supplier of PowerShare technology, which allows multiple buildings to share solar electricity, battery storage and rapid vehicle charging as part of a single energy community. Ferroamp offers a scalable product range, enabling optimal utilisation of solar energy, integrated with battery storage and electric vehicle charging.

Founded in 2010, Ferroamp is listed on the Nasdaq Stockholm First North Growth Market. Our head office is located just outside Stockholm.

Björn Jernström

A little rebellion now and then is a good thing

We are currently witnessing the emergence of a new energy landscape focused on local production, local storage and local consumption. This is a development in which Ferroamp will play a crucial role by integrating all of these factors into housing, commercial and industrial estates using local electrical grids. Future legislative and regulatory changes will pave the way for local electrical grids and energy communities, providing economic benefits for both the end customer and property owners. In addition to being a highly cost-effective solution, it will also contribute to energy security.

While the ongoing energy transition will undoubtedly have far-reaching consequences for and will fundamentally change the energy sector, that is not the end of it. Electrification will also have an impact on other sectors such as steelmaking, aviation, cement production and the automotive industry. Ferroamp will be one of the keys to the success of the ongoing transition.

One might even say that to refer to it as a transition is being a trifle cautious. Rather, what we are witnessing is an electrical revolution. Still, as Thomas Jefferson once said: a little rebellion now and then is a good thing.

Björn Jernström
Founder and CTO

The next generation of optimisation technology for solar energy and intelligent power and energy balancing

Few now question that we as a society must transition to a more sustainable way of life. A systemic shift awaits around the corner, in which we will see fossil fuels phased out in favour of renewable energy sources. We know that if we are to achieve the Sustainable Development Goals of Agenda 2030, one important piece of the puzzle will be electric vehicles. Another is the expansion of solar, wind and hydro-electric energy. By driving the integration of electric vehicles, photovoltaics and battery storage, Ferroamp is an important facilitator of the transition to smart, sustainable urban development, which relies on access to power and mobility services.

So, given that as a society we are well aware of the need to take action and identify solutions, what exactly are the challenges? One issue is that the distribution of electricity is and will continue to be more expensive than the electricity itself. This is a consequence of the decommissioning of nuclear power plants, which were located relatively close to our cities. The vast distances involved in delivering stable hydro-electric power means that the electricity must be transported further. While this makes the expansion of local, sustainable energy sources vital, unfortunately these do not deliver a stable supply around the clock 365 days a year. In contrast to how we reacted to electricity shortages and rising prices two or three decades ago, when the answer was to *save* energy, in today's transition to green electricity and fossil-free transport and cities, we see a clear need to *increase* our electricity consumption. In many cases, this increasing and simultaneous use of electricity leads to a deficit of available power, inflating electricity tariffs for customers and even preventing the expansion of industries or vital measures such as the installation of charging stations for electric vehicles. In some cases and in certain locations, it is not possible to increase the fuse rating of a building, even if one is willing to pay for the service, and obtaining a permit to dig up a street to bury more powerful cables and thus increase capacity is generally a drawn-out process.

The fact that most people have a similar daily routine also creates peaks and troughs in electricity consumption, which in turn leads to variations in electricity tariffs over the course of the day and even more strikingly over the course of the year, with higher tariffs during the winter for example.

The power deficit is becoming increasingly apparent, not least when bills arrive from network operators. Costs for connecting to the grid, for subscriptions and for the electricity consumed have risen sharply over recent years and there is every reason to assume that they will continue to do so.

The Ferroamp EnergyHub system is part of the solution to power deficits and saving money; in may cases you can reduce the fuse rating of your property and in others you will be able to significantly increase energy consumption for facilities such as electric vehicle charging. By creating a parallel local DC grid, photovoltaics, battery storage and charging stations can be integrated into one system offering flexible electricity consumption and greater control. The Ferroamp EnergyHub system's modular construction and scalable technology provide an optimised solution for each property that meets present and future needs and that can easily be adapted to technological advances.

The EnergyHub system changes everything.

A philosophy as simple as it is ingenious. EnergyHub connects photovoltaics, battery storage and electric vehicle chargers to a local DC grid running on locally produced solar electricity. It is also possible to add existing LED lighting to the system and, eventually, many other functions – with the major advantage of almost entirely eliminating power losses. Solar cells generate direct current to charge electric vehicles and storage batteries.

On a purely technical level, EnergyHub, the main product and heart of the system, is a bidirectional inverter that converts alternating current into direct current and vice versa. All components of the system collaborate with EnergyHub, which gathers, measures and analyses data in order to balance power evenly across the phases on the property's electrical grid. EnergyHub can direct installed solar energy capacity to buildings or to a backup battery system and can. for example, supply rapid chargers for electric vehicles.

EnergyHub is the basic component of all installations; other components can then be added according to need. The system is modular and scalable and can be easily adapted to all power requirements, from single-family dwellings to large commercial properties, to reduce the fuse rating and save money or to expand electricity use to functions such as charging electric vehicles, without worrying that power deficits will throw a spanner in the works.

System components

Hardware
EnergyHub
Solar string optimisers (SSOs), battery storage

Software
EnergyCloud

Functions
Phase balancing. PowerShare

Technology
DC nano-grid

Advantages

ENERGYCLOUD
Understand your consumption, production and system performance in detail. EnergyCloud provides highly detailed data in real time, allowing full control of your facility, with built-in analytical tools that provide improved decision-making support for energy-efficiency measures.

BRIDGING TWO WORLDS
EnergyHub converts energy in both directions. By using a single solar inverter for both production and charging, conversion loses van be minimised. Thanks to its scalability, EnergyHub can be expanded to meet all your capacity requirements, from wall-mounted units for smaller systems to 19" rack modules for larger systems up to MW capacity. ACE technology dynamically balances consumption between three-phase transmission lines to facilitate maximum power output.

SCALABLE, INTEGRATED ENERGY STORAGE
Store solar energy directly in the battery, avoiding conversion losses in the AC grid. EnergyHub's energy storage topology enables dynamic dimensioning of energy and power capacity. Combine batteries of different ages, chemistry and size in a single system.

UNLIMITED SOLAR PRODUCTION
Smart, distributed power electronics integrate solar energy with unique production controls, greater flexibility and safety. All solar cell strings are connected to the DC grid for simpler installation and more efficient energy transmission.

DC LOADER
Appliances can be used directly on the DC grid. New IEC International Standards for DC distribution are under development. Futureproof your facility today.

DC NANO-GRID – SMARTER TO BUILD AND TO OWN
EnergyHub uses DC grid technology to integrate solar energy production with storage and charging. This results in lower installation costs and, more importantly, makes future alterations that much easier as new technologies, charging patterns and electrical grids emerge during the expected working life of your photovoltaic system.

Planning your EnergyHub system

In addition to its standard products and services, Ferroamp also offers customised design tools so that retailers, wholesalers and customers can easily calculate their needs and specify a suitable Ferroamp system.

All the tools and information you need to calculate the required dimensions and to design and install your EnergyHub system can be found at ferroamp.se/kunskapsbanken.

Patented Phase Balancing

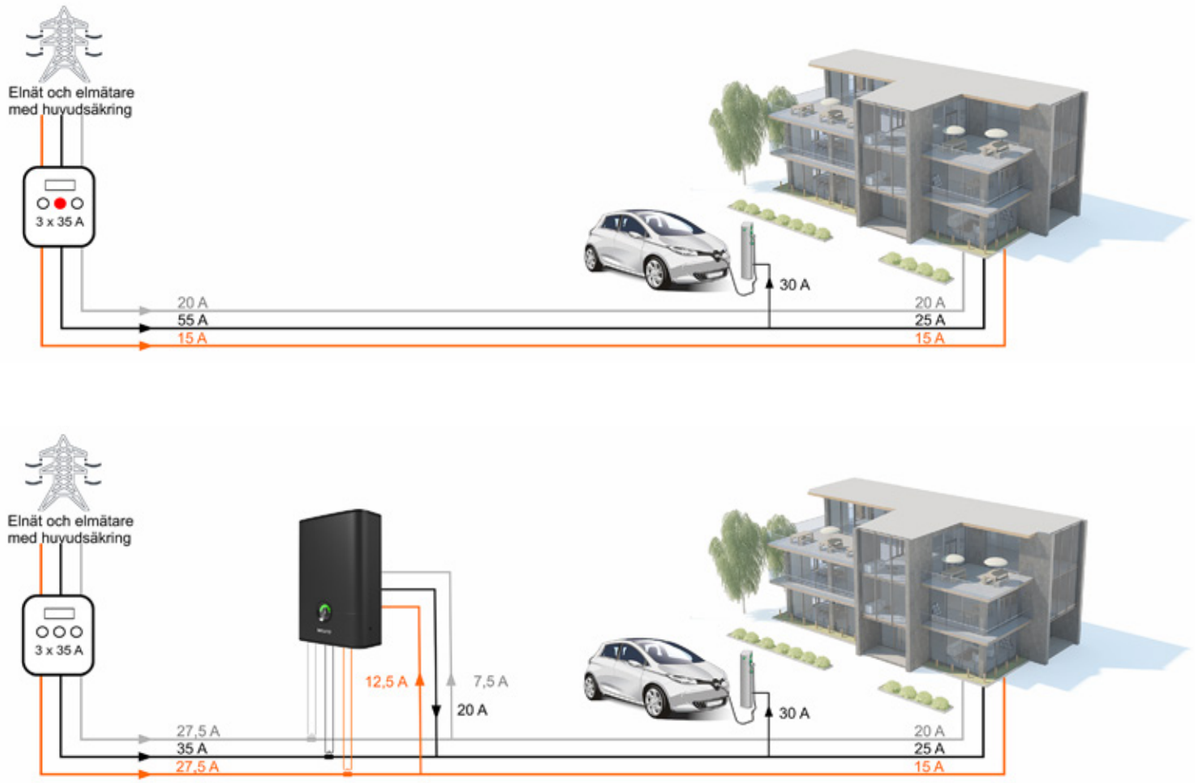
Balancing

Ferroamp's patented phase balancing technology is a function unique to our system, facilitating the more efficient use of a building's connection to the electrical grid. The emphasis is on protecting and maximising the utility of the main fuse, thereby maintaining or even reducing your network charge while increasing consumption.

EnergyHub transfers/switches energy between phase transmission lines to increase the space between the capacity of the main fuse and loads in the building. This extra capacity can either be used to reduce the size of the main fuse or to increase the electrical load; for example, by installing more efficient and faster chargers for electric vehicles.

For commercial premises, this may be a matter of reducing the main fuse from 80 to 63 or even 50 amps, in which case phase balancing technology offers considerable financial benefits. Alternatively, the property owner may avoid the need to increase the size of the main fuse or, when paying for electricity used, the risk of incurring penalty charges.

Phase balancing is quite simply a better and value-for-money alternative, given that every property owner can take control over the main fuse and control costs and peaks during the day.



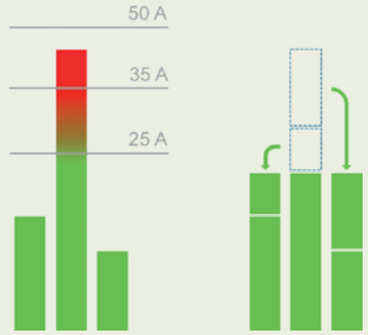
The diagrams above show how the building's main fuse is automatically protected once EnergyHub is installed. A lower main fuse rating reduces bills. Phase balancing works on all types of load.

So, what is the difference between load balancing and phase balancing?

Phase balancing
Means that the electrical load created by, for example, charging electric vehicles, running an air heat pump, heating a pool or outbuildings, etc. is distributed evenly in real time between the three phases of your electricity supply, freeing capacity in the main fuse so that the utility of the property's electrical grid connection is maximised, optimised and streamlined.

Load balancing
Refers to the equal distribution of charging power across all electric vehicles to be charged. Load balancing distributes the available power in the building between the vehicles being charged. Load balancing can be static or semi-static/dynamic and is quite simply a power monitor that distributes charging current between vehicles.

The difference
When using load balancing, it is necessary to consider the other loads on the building, while with phase balancing it does not matter which phase the load is transferred to – everything runs seamlessly in real time.



Wall-mounted 14 kW

Wall-mounted 14 kW

EnergyHub

Changing the way energy is used and produced.

Ferroamp's EnergyHub is available in two versions: EnergyHub Wall, a wall-mounted product ranging from 14 to 28 kW, and EnergyHub XL, a rack-mounted system with 21 and 28 kW modules. The size of your photovoltaic installation and energy storage determines which version/size of EnergyHub you will need. A larger photovoltaic installation will require greater inverter capacity and, naturally, Ferroamp's system can be expanded over time as volumes increase.

The EnergyHub system is fully scalable. If you want more inverters, or if your installation is too large for one EnergyHub XL 28 kW to cope with, the system can be easily expanded. Ferroamp's system allows multiple modules to be chained, which is ideal for apartment buildings, commercial premises and factories.

As an entry level to energy efficiency, EnergyHub can be used as a stand-alone system for metering and phase balancing. All data regarding energy consumption and production is collected in Ferroamp's cloud service, EnergyCloud, with second-precision, providing new and unique opportunities for monitoring, energy services and increased efficiency using customised tools. This is an optimal system that provides property owners with maximum opportunity to choose how and when solar energy is used. Either prioritise immediate use in the building or store the energy in batteries. Another alternative is to sell overcapacity back to the national grid. Ferroamp's EnergyHub gives property owners both the power and the means to govern and control energy consumption and power output in order to achieve more sustainable and financially beneficial building operation.

Modular, 21 – 28 kW

Scale up with EnergyHub XL and save more.

Scalable, bidirectional inverter with DC nano-grid technology.

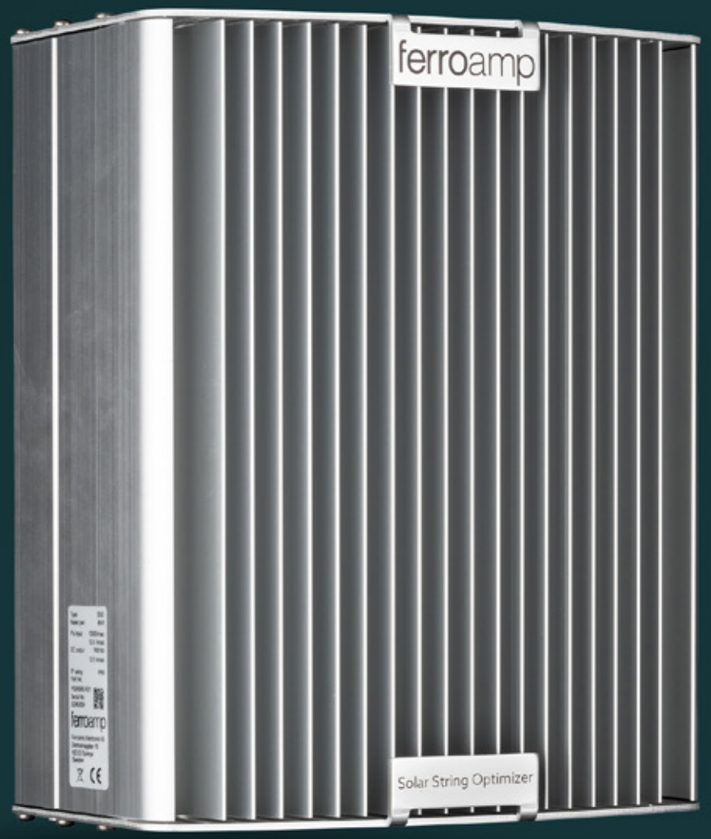
The EnergyHub system provides a new, futureproof way to integrate photovoltaics, battery storage and electric vehicle charging with a direct current (DC) grid. All this with a single inverter that makes it simple to add DC devices as and when required.

The bidirectional inverter builds a bridge between the utility's AC grid and the local DC nano-grid inside the building to which photovoltaics, batteries and chargers are connected. Multiple EnergyHub XL modules can be mounted in a 19" rack up to a maximum of 140 kW (5 × 28 kW) per rack. Energy production and consumption measurements with second-precision, combined with an internet connection, allows a new level of monitoring of energy services and energy-efficiency tools.

Our patented ACE technology offers phase balancing to reduce network charges or facilitate rapid charging of electric vehicles. DC nano-grid architecture makes it possible to store electricity or use it immediately on the DC side for optimal flexibility and minimal energy losses.

- **A single inverter for electric vehicle charging and storage.**
- **Phase balancing ACE technology.**
- **Advanced energy measurement and analysis.**
- **Futureproof design makes expansion easy.**
- **Use DC loads in your building.**

Our optimiser has been developed to meet future stricter EMC requirements for photovoltaic installations.



Single 8

Solar String Optimiser

Ferroamp's Solar String Optimiser (SSO) is used to connect solar panels to the EnergyHub system. The Solar String Optimiser is an important component of Ferroamp's direct current grid system. Our award-winning SSO has a number of unique attributes, including the highest efficiency on the market, great flexibility in terms of the size of the installation and a higher level of safety in the event of fire in the building. SSO is a market leader, delivering 760 volts DC regardless of the number of solar panels in a string, an important factor in optimising and stabilising an installation and building it at the lowest possible total cost of ownership (TCO).
(min. 100 V, max. 720 V, see the SSO product data sheet for more details)

The Solar String Optimiser offers a new level of flexibility in planning, installing, using and maintaining photovoltaic installations. Each SSO comes with a built-in maximum power point tracker (MPPT) designed to constantly seek the correct power on the solar panel string.

This means that, rather than being limited to the MPPT inputs on the inverter, you can now add more SSOs as and when necessary. Flexible and Scalable!

An installation can be expanded with between 1 and 64 SSOs, while several systems can be installed to cope with installations over 1 megawatt. The maximum solar electricity in a DC grid is 512 kW. One SSO = 8 kW, 8 × 64 = 512 kW of solar electricity per DC grid.

Ferroamp's SSOs contain relays that cut power to the entire DC grid when power is cut to EnergyHub or when Ferroamp's circuit breaker is activated by remote control. This important safety function is unique to Ferroamp's system in the event of a power cut or fire.

Because Ferroamp chose the latest silicon carbide technology, efficiency is as high as 99.5% for maximum utilisation of solar energy. Our Solar String Optimiser has been developed to connect directly to Ferroamp's DC grid and can be used with all types of solar cells. One of the products many advantages is that it does not interfere with radio or emergency services communication.

Optimisation and monitoring of solar cells at string level.

Maximum efficiency 99.5%.

Integrated circuit breaking.

Fewer cables means quick installation.

Versatile energy storage

DC-connected energy storage

Solar energy can be used immediately for all consumption related to building operations, not least charging electric vehicles. The energy can also be stored in batteries for use after sundown or to reduce peak demand on the grid, thereby reducing the need to buy electricity when it is most expensive, during the afternoons and evenings.

If you install our battery storage in a building without solar cells, the batteries can be charged with cheaper night-time electricity that can then be used to cut consumption of peak-time energy. Many property owners benefit from using stored electricity when electricity prices are higher due to lack of capacity on the grid. If you buy electricity from the grid at night, when it is cheaper, and store it in your own batteries for use at peak times, you save money. Today, there is also a clear need to match production to consumption and use battery storage and solar electricity to balance the needs of buildings.

Which battery a property owner should use depends on the what they are trying to achieve. There are a number of parameters to consider. If your primary aim is to reduce peaks in consumption, the type of battery should be adapted to the nature of the peaks in question, with the ability to discharge quickly. If your primary objective is to support the electrical system once the sun has gone down, the battery can be adapted to meet energy needs over time. Price and chemical composition may also influence your choice. Ferroamp offers both Nilar batteries, which are environmentally certified in Sweden, and lithium-ion batteries. It is important to take into account the total working life, capacity and depreciation period based on the construction of your photovoltaic and battery installations. Various batteries of different sizes and ages can be connected to Ferroamp's DC grid in order to achieve a larger battery pack.

The EnergyHub system is currently compatible with the following makes of battery: PSM, Pylontech and Nilar, all of which are adapted for use in buildings or container solutions that require temporary or stationary additional electricity. All batteries are free from cobalt and come with a complete battery management system (BMS). Ferroamp's PSM and Pylontech batteries contain lithium iron phosphate (LiFePO4), while Nilar are nickel metal hydride (NiMH) batteries.

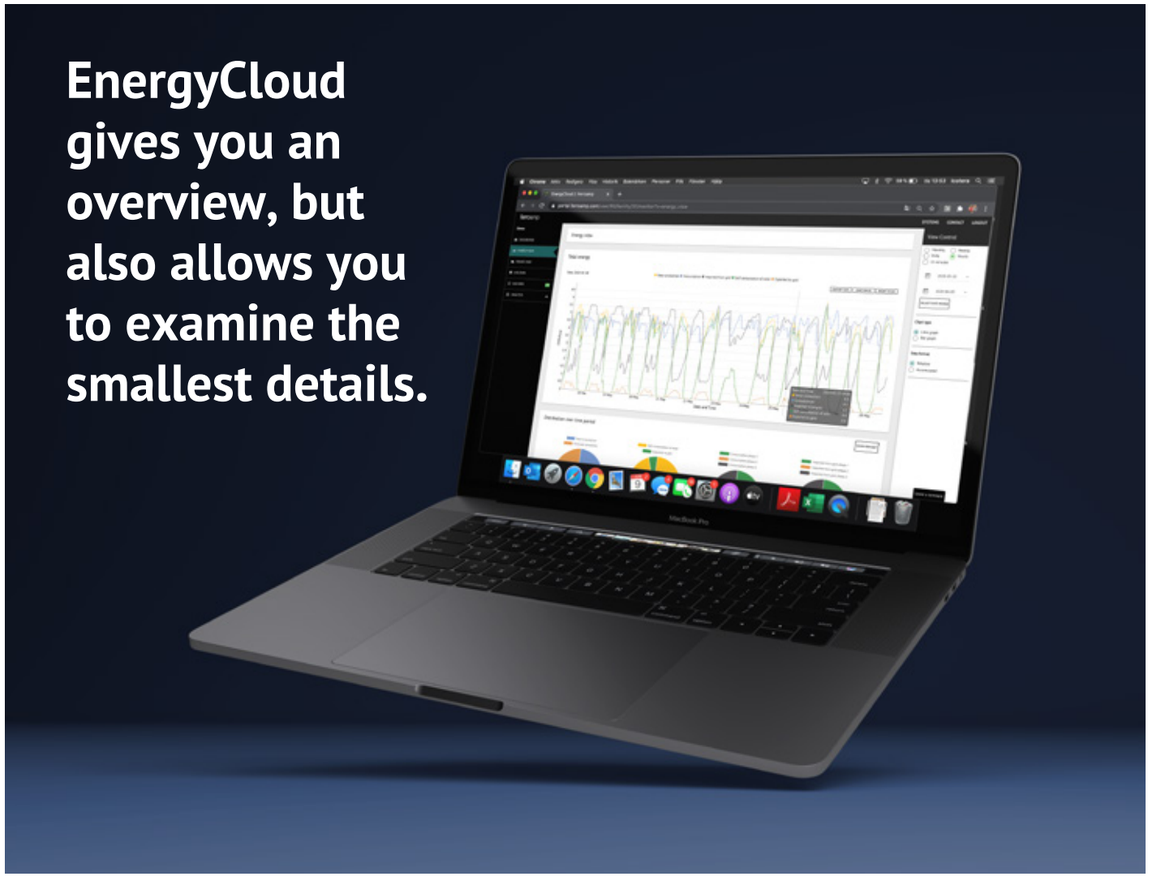
Nilar
Made in Sweden, recyclable Nilar batteries are manufactured using renewable energy. They are equally at home in the home as in larger commercial or industrial premises. Home Box, the smallest model, is ideal for modest storage requirements. Cabinet is a larger model that comes in four sizes and can be chained to meet the needs of extremely large facilities.

Pylontech
Pylontech batteries are designed to cope with large and extended power peaks, regardless of when they occur, as they charge and discharge more quickly, and are therefore best suited for large apartment buildings. They are available in the models H1 and M1.

PSM
PSM batteries are small in both size and kilowatts and are suited to large houses, farms or small apartment buildings. They are available in sizes 10 kWh, 12 kWh and 15 kWh.

So, what is the difference between battery storage and energy storage?

Energy storage is an overarching term that covers so much more than simply batteries; for example, hydrogen storage or hot water. Ferroamp sells batteries for storing energy.



To measure is to know

EnergyCloud

Knowledge makes all the difference.

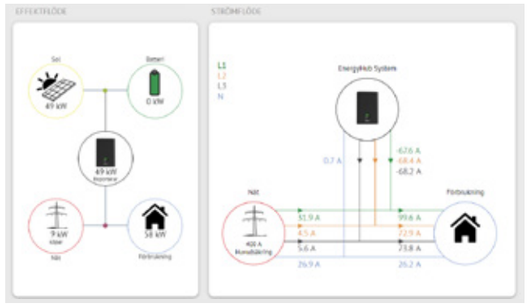
Ferroamp's EnergyCloud portal allows you to monitor and remotely control consumption and storage. Real-time or historical data on the system's operation and performance are displayed in great detail. EnergyCloud also provides a number of analytical functions and simulation tools and can be tailored to your specific needs. Although during routine operation an overview is generally adequate, when changes in user patterns or technological developments prompt you to make changes to the system, historical data may prove invaluable in making data-driven decisions on anything from energy saving measures and operational settings to expansions and new investments.

For further detailed information on the subject, we recommend Svenska Kraftnät's Control Room page at svk.se.

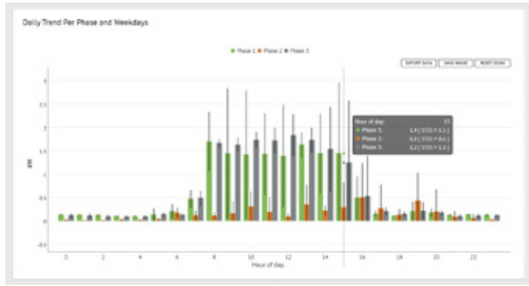
Monitoring
Cloud-based visualisation and system control.

Analysis tools
Highly detailed data may be difficult to grasp. Our analysis tools allow you to get down to essentials.

Simulation tool
As a customer, you run your own simulations of how a battery can contribute to the building.



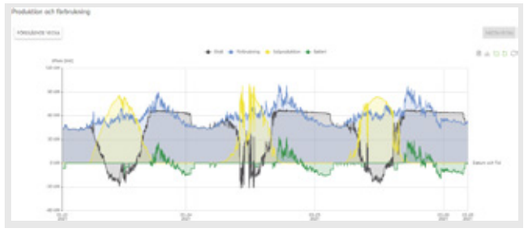
The flow of power and current through your EnergyHub system. The power flow provides an overview of your system. Where the energy is going right now, how much solar electricity you are producing and whether your battery is charging or discharging. The diagram provides an overview of your building per phase, as well as the rating of the building's main fuse.



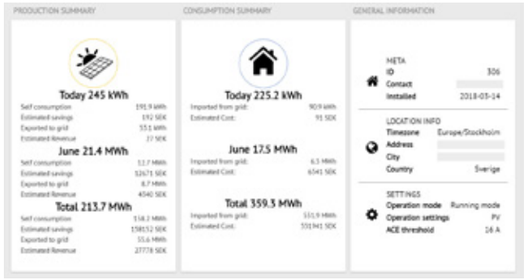
Load profiles provide you with an overview of the loads placed on your grid connection over a selected 24-hour period. This is an important tool for assessing load variation over the course of the day in order to assess your own use of solar electricity. It also shows the disparity between weekdays and weekends.

The solar panel strings display provides an overview of installed solar panel strings and how much energy they are producing.

The dashboard displays real-time information on how much electricity you are buying or selling to the electrical grid, your energy consumption, solar electricity production and battery power in the property's EnergyHub system.



The power view allows you to see solar electricity production, electricity bought from and sold to the national grid and any battery, with second-precision going back one week.



The production summary shows the electricity produced during the day, current month and in total during the system's lifetime, as well as estimated savings.
The consumption summary shows consumed and purchased electricity during the day, current month and in total during the system's lifetime, as well as estimated costs.

Consultancy Services

The correct, smooth and quality-assured installation of Ferroamp's EnergyHub system will result in lower costs in all areas and, ultimately, a satisfied customer. To this end, Ferroamp has developed a number of services to support you when you choose to install our system. We also provide a number of support, optimisation and analysis services for already operational systems.

Expert support for calculating the necessary dimensions of your system is also available, as is operational and monitoring support, aimed at property companies, municipal housing companies and tenant-owner associations. This provides Ferroamp with direct monitoring access to the system in order to ensure the highest possible operational efficiency. We also offer training to property managers and environmental engineers who wish to manage their own systems.

Ferroamp can help you with anything from feasibility studies, project management and installation to system operation.

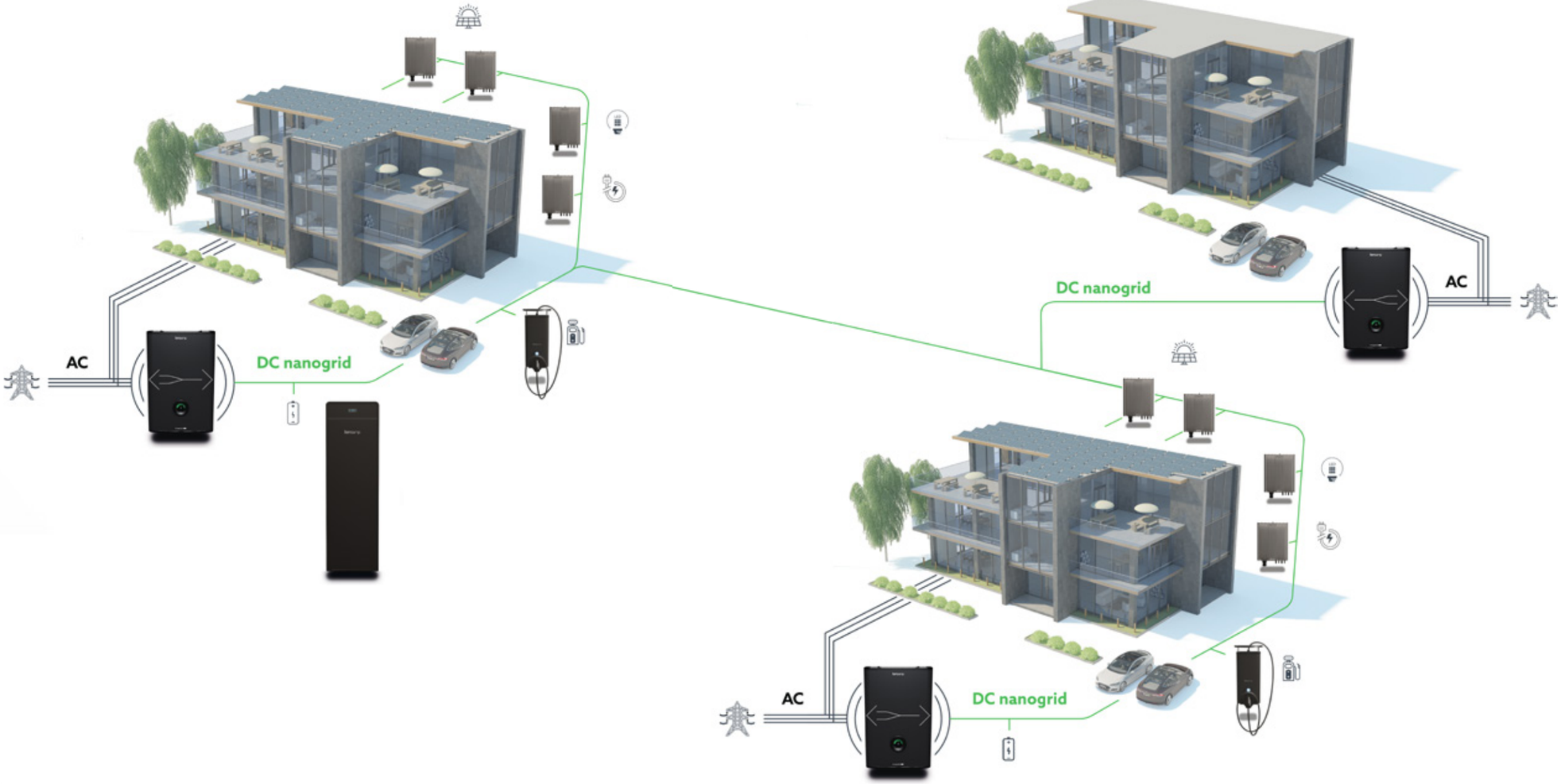
Contact us at sales@ferroamp.se and we will be delighted to tell you more.

Interconnected devices optimally controlled by EnergyHub.

Solar energy produced on the roofs with best conditions.

The EnergyHub system determines when stored energy should be used ahead of energy purchased from the grid and for which buildings.

Maximum electric vehicle charging with minimum main fuse rating, regardless of building.



Easy to understand. Yet still revolutionary.

PowerShare

By linking several EnergyHub systems, multiple buildings can cost-effectively share energy and power resources on a local direct current grid.

By taking full advantage of the roofs that receive most sunlight, solar energy can be shared with other buildings with less favourable conditions. The solar energy can be used collectively by all buildings in a tenant-owner association for example.

You retain complete control over the power output to the connected buildings, opening the way for new business models with energy-efficiency services and energy trading. More tenant-owner associations can get the most out of their solar electricity by sharing battery storage and installing rapid charging for electric vehicles.

PowerShare increases self-consumption of the energy you produce, while at the same time the benefits of energy storage are shared among more buildings. In this regard, Ferroamp is the market leader, having already built several facilities based on the company's patented technology.

Recognition for Ferroamp's PowerShare includes the E-Prize 2018 and the Smarter E Award 2018.

Why does Ferroamp use a DC grid?

DC grids are a prerequisite for the PowerShare function. The reasoning behind the choice of direct current for this technology is controllability at end points. Should one use alternating current it would, for example, be impossible to control the path of the available solar energy, which would flow where the voltage is lowest and not necessarily where it is required for consumption. DC grids allow one to control the path of the energy.

Another advantage of direct current is that you can use a higher voltage, 760 volts, meaning that a smaller cable can be used. In large buildings or installations, the reduced use of metal alone represents a significant saving in both cash and CO_2 as less copper and aluminium is needed to transmit direct current than 230 V alternating current.

There is nothing unique or even unusual about DC technology.
Solar cells produce direct current and it is stored and used by electric vehicles and other batteries. However, other parts of the building use AC voltage and so the energy must be converted between the two. The bridge between the electrical grid (AC) and local DC grid is located in EnergyHub, where the energy is efficiently converted into direct current with minimal power losses. Building and using a DC grid can save up to 30%* of the power lost in other systems.

**According to multiple independent studies.*

“This was a strategic choice that turned out to be a dream solution!”

Jonas Tannerstad,
head of technical installations
ÖrebroBostäder AB

Reference case

ÖrebroBostäder

According to Svenska Kraftnät, the authority responsible for Sweden’s national grid, lack of electricity capacity presents an increasing risk. Faced with expanding its electric vehicle charging network and the threat of increasing electricity prices, municipal housing company ÖrebroBostäder (ÖBO) has created its own electricity system using the latest technology from Ferroamp, including solar panels and battery storage. This has reduced consumption from the national grid by half and saved millions of kronor on electricity for the municipality’s housing stock.

“By six years ago we had reached the limit of our energy saving measures; we could do no more. By using the new EnergyHub technology from Ferroamp, with have moved that limit far into the future. We have created our own electrical grid to transfer current between phases, produce, store and sell electricity. This was a strategic choice that turned out to be a dream solution,” says Jonas Tannerstad, head of electrical and automated installations at ÖrebroBostäder.

ÖBO began by testing the system is a single property and could immediately confirm not only cash savings but also an increase in the value of the property. The municipally-owned property company has now expanded EnergyHub to 50 properties.

“At the time of our last tertiary report, ÖBO had more than halved electricity consumption compared to 2005, from 59.7 to 29.4 GWh/year. This represents many millions, both in lower operating costs and higher property values,” attests Jonas Tannerstad.

ÖrebroBostäder’s future strategy is now clearly staked out. Building by building, district by district, the municipality will convert to the new electricity system. Self-generated electricity from solar panels is stored in large batteries and distributed and balanced between low and high energy consumption in buildings using EnergyHub. ÖBO thereby creates its own electrical grid to transmit current between its properties based on needs. At the same time, the company contributes to solving Svenska Kraftnät’s problem of frequency regulating the national grid to account for high and uneven consumption.

“By meeting some of our electricity needs ourselves, we can store and share energy to make our energy consumption more efficient. We move from building level to system level and at the same time we can offer energy services to the national grid,” concludes Jonas Tannerstad.

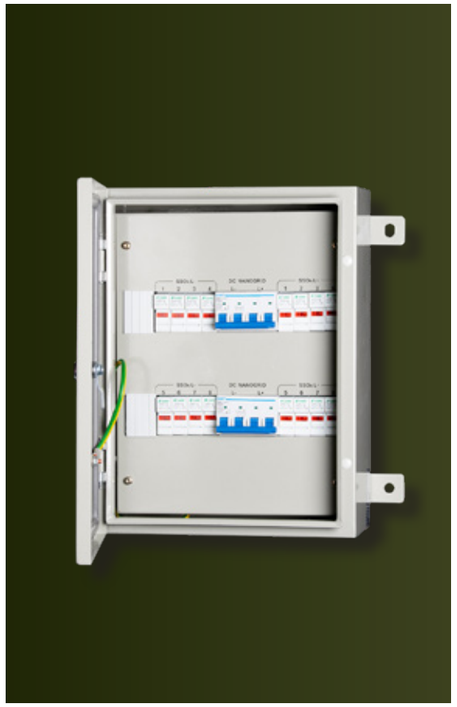
Accessories

Fireman’s switch

For EnergyHub systems from 7 to 152 kW.
The cost-effective fireman’s switch system.

The EnergyHub system with Solar String Optimiser (SSO) provides a new and cost-effective way to fully disconnect from all solar panel strings in the event of fire risk. The system uses the existing safety relays in Ferroamp’s SSOs to disconnect from the nearest possible point to the solar panel strings. No additional expensive DC circuit breakers are required. The product consists of a remote-controlled fireman’s switch that interrupts DC bus voltage and the “keep-alive” messages sent from EnergyHub to the SSO, forcing their internal safety relays to initiate within 10 seconds.

- **State-of-the-art fire safety.**
- **Simultaneous disconnection of all strings.**
- **Circuit breaker close to the solar panel string.**
- **Redundant switches.**
- **Cost-effective solution.**



Distribution box

For EnergyHub systems with up 15 SSOs.

Ferroamp’s distribution box offers a simple and cost-effective installation solution for the EnergyHub system and its Solar String Optimiser (SSO). Installation close to SSOs allows the use of the 760 volt DC grid’s fewer, thinner and longer cables, thereby reducing both installation time and materials costs. The box has individual fuses for each SSO and a circuit breaker for the DC nano-grid. For safety reasons, we recommend that cables are fed from beneath when installed outdoors.

Total SSO connections	5	8	15
Maximum DC current	63 A	126 A	189 A
Maximum DC voltage	1000 VDC	1000 VDC	1000 VDC
Dimensions H × W × D (mm)	250 × 430 × 150	400 × 430 × 150	75 × 580 × 150
Weight (kg)	8	13	23

Current transformers

Sensor for measuring input AC current.

In order to use the ACE function and analysis tools, current transformers must be installed and connected to the EnergyHub. It is important that open-circuit current transformers are completely sealed around the cable, otherwise there is a risk that measurements will be incorrect and you will not be able to calibrate the EnergyHub. Current transformers must be installed in EnergyHub systems with batteries.

		RANGE	DIAMETER SIZE CABLE LENGTH	ACCURACY PHASE ANGLE	CT RATIO	USED WITH
	CT 100A PA00294	2 ..100A	13 mm 22 × 32 × 58 mm 10 m	+-2% 7°	2000	EnergyHub EnergyHub XL
	CT 160A PA00295	8 ..160A	16 mm 32 × 31 × 45 mm 10 m	+-2% 7°	4000	EnergyHub EnergyHub XL
	CT 300A PA00296	15 ..200A	36 mm 42 × 66 × 92 mm 10 m	+-1,5% 6°	62000	EnergyHub EnergyHub XL
	RAG 600A PA00965	60 ..600A	120 mm NA 1 m	±3% 8°	12000	EnergyHub XL (230/24V supply included)
	RAG 1200A PA00966	120 ..1200A	120 mm NA 1 m	±3% 8°	24000	EnergyHub XL (230/24V supply included)
	RAG 2000A PA00967	200 ..2000A	120 mm NA 1 m	±3% 8°	40000	EnergyHub XL (230/24V supply included)

Product List

Product List

CATEGORY/PRODUCT	ART. NO.	E-NUMBER
ENERGYHUB WALL		
EnergyHub 14 kW	PH00205	5289206
EnergyHub XL 21 kW	PH01106	5289199
EnergyHub XL 28 kW	PH01105	5289200
ENERGYHUB RACK		
Rack EnergyHub XL 24U incl. 21kW	PH01337	5289514
Rack EnergyHub XL 24U incl. 28 kW	PH01227	5289420
Rack EnergyHub XL 42U incl. 28 kW	PH01228	5289421
EnergyHub XL 21kW module	PH00798	5289205
EnergyHub XL 28 kW module	PH00030	5289208
SSO		
Solar String Optimiser 8kW	PS00990	5289195
SSO 8 kW Installation Kit	PA00361	5289184
DC DISTRIBUTORS		
Distribution box 5 SSO	PS00778	5289181
Distribution box 8 SSO	PS00779	5289180
Distribution box 15 SSO	PS00772	5289182
CURRENT TRANSFORMERS		
Current transformer 100 A	PA00294	5289187
Current transformer 160 A	PA00295	5289186
Current transformer 300 A	PA00296	5289185
Current transformer 600 A	PA00965	5289183
Current transformer 1200 A	PA00996	5289422
Current transformer 1800 A	PA00967	5289423
FIREMAN'S SWITCH		
Fireman's switch 100 A	PM00512	5289198
Firefighter Switch 200 A	PM00570	5289197

CATEGORY/PRODUCT	ART. NO.	E-NUMBER
FUSES AND DC CIRCUIT BREAKERS		
Fuses 10 A 1000 VDC	CE01100	5289192
Fuses 15A 1000 VDC	CE01293	
Fuses 20A 1000 VDC	CE01104	5289188
Fuse holder 32 A 1000 VDC	CE01101	5289191
DC circuit breaker 40 A 1000 VDC	CE01102	5289190
DC circuit breaker 63 A 1000 VDC	CE01103	5289189
BATTERIES		
Battery Power Stn. 10 kWh/4 kW	PB00901	5289223
Battery Power Stn. 12.5 kWh/5 kW	PB00999	5289224
Battery Power Stn. 12.5 kWh/10 kW	PB01000	5289211
Battery Power Stn. 15 kWh/6 kW	PB00902	5289214
Battery Power Stn. 15 kWh/12 kW	PB00903	5289213
Battery Nilar 5.76 kWh/5.76 kW	PB00941	5289222
Battery Nilar 11.5 kWh/6 kW	PB00900	5289215
Battery Nilar 11.5 kWh/11 kW	PB00857	5289217
Battery Nilar 17.3 kWh/16.5 kW	PB00838	5289220
Battery Nilar 23 kWh/22 kW	PB00839	5289219
Battery Nilar 28.8 kWh/27.5 kW	PB00858	5289216
Battery Pylon 25.9 kWh/24 kW	PB00905	5289212
Battery Pylon 25.9 kWh/12 kW	PB00825	5289221
Battery Pylon 81 kWh/36 kW	PB00960	5289196
OTHER ACCESSORIES		
Parallel Coupling Kit 2 EnergyHub Wall 21/28 kW	PA01223	5289517

For installers

Training and sales via wholesaler

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Our awards

Ferroamp has won many awards and much recognition over the years for innovations related to our EnergyHub system. Among other accolades, our next-generation solar string optimisers won the Intersolar Award, the global solar energy sector's most prestigious prize, while our PowerShare technology has received considerable recognition, including the E-Prize 2018 and the Smarter E Award 2018.

This is fantastic in many ways: it both demonstrates the high level of innovation involved in the EnergyHub system and, just as importantly, offers proof that we are on the right track going forward. We are leading the development of a fossil-free future.

Affärsvärlden
Outstanding IPO 2020

Intersolar Award
2020

Global Cleantech 100
one to watch 2019

Global Cleantech 100
one to watch 2018

E-Prize
Veckans Affärer 2018

PV Magazine Array Changing
Technology Award 2018

The Smarter E Award
Intersolar 2018

Intelligent Energy
Management Challenge 2016

EES Award Winner
2016

Global Cleantech 100
one to watch 2016

Honourable mention
Performance of the
Year 2016

Swedish Society for Nature
Conservation Innovation
Competition 2015

Skanska Deep
Green Challenge 2015

"It is fairly easy to calculate the benefits and added value of phase balancing a building's electrical grid"

Arvid Nyqvist, *energy manager*

LUNDBERGS FASTIGHETER

Lundbergs was one of the first private-sector property companies to realise the possibilities of Ferroamp's EnergyHub system.

Electricity. Reinvented.

ferroamp

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